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POLLINATION OF ALFALFA BY BEES OF THE GENUS  
*MEGACHILE*. TABLE OF CANADIAN SPECIES  
OF THE *LATIMANUS* GROUP.

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A study has been made of the species of bees that trip and therefore, presumably, pollinate the flowers of alfalfa in the parts of Canada where this plant is or can be grown for seed.

In July and August, 1916, the females of a species of leaf-cutter bee, *Megachile diligens*, Sladen\* (*latimanus* Cockerell, not of Say) were found to be visiting the fields of alfalfa in bloom and tripping the flowers in considerable numbers at Medicine Hat and Lethbridge, Alta., each flower visited being tripped. The same thing was noticed in 1917, when they were observed to be tripping the flowers at an average rate of 17 per minute. This species was more numerous in the alfalfa fields than five other species of *Megachile* together, (*perihirta* Ckll., *calogaster*, Ckll., *vidua* Sm., *manifesta* Cr. and *brevis* Cr.) all of which performed the same service. Several species of bumble-bees, fairly plentiful, worked more slowly and often failed to trip the flowers. Honey-bees, also plentiful, visited the flowers without tripping them.

Observations made on July 20, 1917, at Summerland, B.C., and on July 21, at Keremeos, B.C., gave the same results, except that *perihirta* was the abundant species, *M. diligens* not having been met with in British Columbia.

*M. perihirta* was found nesting gregariously in a nearly new and bare gravel railway embankment at Cochrane, Ont., on August 9, 1917. A nest of the same species was found in a nearly new gravel road leading to a dwelling house at Invermere, B.C., in July, 1914. There is, therefore, some hope that *perihirta* might be encouraged to breed in the vicinity of alfalfa fields by spreading gravel and making it firm by rolling. *Diligens* might also be encouraged in this way because it is very closely related to *perihirta* and probably has similar nesting habits.

Closely related to these two species is a third, *latimanus* Say, found in Southeastern Canada. These three species constitute

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\*The name *diligens* was first used in the Agricultural Gazette of Canada, Feb. 1918, p. 125.  
September, 1918

what may be called the *latimanus* group to which Robertson gave the name *Xanthosarus*.

The males of all three species were taken at the wild liquorice (*Glycyrrhiza lepidota*) at Lethbridge on June 28, 1914. The flowers of this plant wither about the middle of July, and *diligens* was found in abundance on *Psoralea argophylla* within the railway fence between Redcliff and Medicine Hat on July 31, 1917. As both these plants are *papilionaceous*, it is not surprising that alfalfa should prove attractive to these bees. The females of *diligens* show considerable hostility to a person trespassing in the alfalfa fields by zigzagging before him more frequently and more menacingly than bumble-bees do in a field of red clover, but they do not attempt to sting.

The females of the *latimanus* group are very active and energetic, far more so than honey-bees or bumble-bees. Their industry is equalled only by that of *Clisodon terminalis* (*Anthophora furcata* of Europe) which has not been observed at alfalfa except at Ottawa. *Perihirta* shows melanism in the north and on the Pacific Coast. No species answering to the description of the *latimanus* group is recorded in Friese's monograph of the European species of *Megachile* in "Die Bienen Europas," published in 1899.

As the species of the *latimanus* group are very closely related, and not easy to separate, especially in the females, the following table will be useful:

#### **Latimanus Group. (*Xanthosarus* Rob.)**

♂.—Fore tarsi dilated, middle femora swelled so that they are stouter than hind femora, *middle basitarsi with a large process or tooth on underside*.

♀.—Large, length 12 to 15 mm. pollen brush pale red, paler at base, white felt hair bands on the apical margins of abdominal segments 3 to 5; 6th dorsal segment well clothed with comparatively long hair which becomes shorter and decumbent towards and at the apex. This hair is white to pale golden but black in northern localities, *and there are always some pale, reddish hairs on the sides of the 6th segment*.

#### **MALES.**

1. *Process on middle basitarsi narrow and ridge-like*. Pile pale yellow-brown, becoming paler on exposure. Abdomen densely

clothed, the pale felt bands on the apices of segments 2 to 5 scarcely developed. Length 11 to 13 mm.....*perihirta* Ckll.

Haileybury, Ont.; Cochrane, Ont., (on *Epilobium angustifolium*), August 8, 1917; Lethbridge, Alta.; June 29, 1914; common at Summerland, B.C., Keremeos, B. C., and Victoria, B.C., in July.

♂. Process on middle basitarsus nearly as wide as basitarsus.....2

2. Pile bright yellow-brown, fading on exposure to pale yellow-brown, abdomen densely clothed, the pale, felt bands on the apices of segments 2 to 5 scarcely developed. Process on middle basitarsus rounded. Anterior tibiae pale below. No spine in front of the middle coxæ. Length 12 to

14 mm.....*latimanus* Say.

Digby, N.S.; Ottawa, Ont.; Aweme, Man.; Melfort, Sask.; Lethbridge, Alta.

Pile very pale yellow-brown, fading on exposure to white. Segments 4, 5 and 6 sparsely clothed. Well-marked white felt bands on apical margin of segments 3, 4, 5. Process on middle basitarsus with minute crest at apex. Fore tibiae black on basal half above. A spine in front of the middle coxæ.\* Length 12 to

14 mm.....*diligens* Sladen (*latimanus* Ckll. not of Say).

Common at Medicine Hat, Alta., and Lethbridge, Alta., throughout July and August.

#### FEMALES

1. Pile on thorax and base of abdomen greenish white, soon becoming white. Few or no black hairs on upper side of thorax (hairs on disc of thorax short and easily rubbed off). White felt bands on apical margin of segments 3, 4 and 5 wider (about .25 mm. wide in centre of segment 4). Hair on segment 6 entirely pale. Pollen brush pale red only on apical part.....*diligens* Sladen (*latimanus* Ckll. not of Say).

Common at Medicine Hat, Alta.; Redcliff, Alta., and Lethbridge, Alta., throughout July and August.

Pile on thorax and base of abdomen pale brownish yellow, be-

\*This remarkable character was pointed out to me by Mr. J. C. Crawford.

coming paler on exposure. A patch of black hair on centre of upper surface of thorax. *White felt bands on apical margin* of segments 3, 4 and 5 *narrower* (about .15 mm. wide or less in centre of segment 4) and narrowed or interrupted in centre, at least on segments 3 and 4. Pollen brush more extensively red.....2.

2. Hair on segment 6 denser, never mixed with black. Apical felt band on segment 5 never interrupted in middle. Black patch on thorax never large. Red of pollen brush somewhat paler... *latimanus* Say.

Fredericton, N.B.; Ste. Anne de la Pocatiere, Que.; Ottawa, Ont., common on sunflowers; Toronto, Ont.; Aweme, Man.; Lethbridge, Alta.; July and August.

Hair on segment 6 less dense, usually pale and almost entirely black in specimens from Northern Ontario and Northern Alberta; these specimens and specimens from Victoria, B.C., have the white felt bands, on apices of segment 3 and 4, and also sometimes on segment 5 very weak and widely interrupted in middle. Black patch on thorax larger (in specimens from Northern Ontario and Northern Alberta covering almost the entire upper surface). Red of pollen brush somewhat brighter.....*perihirta* Ckll.

Thornloe, Ont.; Cochrane, Ont.; Athabaska, Alta.; Lethbridge, Alta.; Invermere, B.C.; Penticton, B.C., Keremeos, B.C. and Victoria, B.C. Specimens from the interior valleys of Southern British Columbia are almost indistinguishable from those of *latimanus* Say.

Next in importance to the species of the *latimanus* group in the pollination of alfalfa is *Megachile calogaster* Ckll., a variety of, or closely related to *M. melanophæa* Sm. *M. calogaster* has no white felt bands at the apices of any of the abdominal segments, and segments 3 to 5 are black haired. The female has a bright red pollen brush, and the fore tarsi of the males are dilated and pale as in the *latimanus* group. It is common in Southern Alberta and Southern British Columbia, flying from about the middle of June until about the end of July, that is two or three weeks earlier than those of the *latimanus* group. It is found on many flowers besides alfalfa.